

TWR-17543 Vol. VIII

Flight Set 360T004 STS-30
Systems Tunnel Component Final Report
Volume VIII
Final Release

26 May 1989

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MORTON THIOKOL, INC.

Aerospace Group

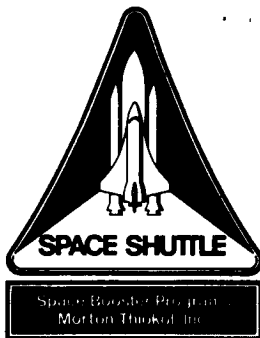
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ABSTRACT

Volume VIII deals with the systems tunnel component of the RSRM-4 flight set. Postflight inspections of the floor plate and splice plates, the thermal protection system and the bondlines are discussed. All observations were as expected, with no problems noted.

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ACRONYMS

EPDM Ethylene Propylene Diene Monomer
KSC Kennedy Space Center
PEEP Postflight Engineering Evaluation Plan
RSRM Redesigned Solid Rocket Motor
STS Space Transportation System
TPS Thermal Protection System
USBI United Space Boosters, Inc.

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1.0 INTRODUCTION

STS-30 was launched from KSC pad 39B on 5 May 1989. Two of the RSRMs were part of the launch system and were designated by RSRM-4A (360T004A) and RSRM-4B (360T004B). Both motors incorporated the aluminum floor plate systems tunnel as shown in Figure 1. Following booster separation and splashdown, the motors were recovered and returned to Cape Canaveral Hangar AF for disassembly and inspection.

In an attempt to standardize and document the evaluation of flight RSRM's, a PEEP has been written (Reference 1). The PEEP outlines the basic evaluations to be performed at Hangar AF. Appropriate procedures contained in this plan were used to evaluate the systems tunnel components. The intent of these procedures is to insure that all pertinent evaluation points are examined and documented in a consistent and complete manner.

2.0 OBJECTIVE

The objective of this report is to document the postflight condition of the systems tunnel components used on RSRM-4A and RSRM-4B.

3.0 SUMMARY

The TPS coated covers were observed to be unbroken and undented during open assessment. Small areas of paint blistering and TPS pock marks were observed. Sooting was seen on the TPS surface, but not in the pock marks, indicating damage due to splashdown. Following open assessment, hydrolaze removal of the systems tunnel TPS was performed. Inspection of the Morton Thiokol components and bondlines followed decabbling. No loose, missing or damaged components were seen. The shear ply to case and shear ply to aluminum floor plate bondlines appeared perfect. The aluminum ground straps remained firmly bonded in place.

4.0 CONCLUSION

Insulation and Component Design found no reportable conditions and concluded the RSRM-4A and RSRM-4B systems tunnel components performed as designed.

5.0 RECOMMENDATION

Insulation and Component Design recommend that the systems tunnel components continue to be inspected postflight to verify performance as designed.

6.0 DISCUSSION

The first inspection (visual) of the RSRM-4A and RSRM-4B systems tunnels was performed during open assessment, immediately following removal from the water, safing of the linear shaped charge and prior to hydrolazing. The inspection of the tunnel covers was performed to find potential damage to Morton Thiokol's underlying components. The system tunnel covers and TPS coverings are the responsibility of United Space Boosters Inc. The system tunnel covers were unbroken and undented. Small areas of paint thermal-blistering and TPS pockmarks were noted on the bondline cork insulation, typically less than an inch in diameter. The pock marks were shallow, typically less than 0.1 inch deep, and attributed to nozzle severance and splashdown debris. No sooting or heat effect was evident within the pocks.

Following open assessment, the boosters were moved into the hydrolazing bay to remove bondline insulation (cork, STW4-2700) and the tunnel cover TPS (K5NA (STW5-3183) and a USBI ablative material). Cover removal and decabbling followed. The exposed floor plates, splice plates and bondlines were then visually inspected. The plates and associated structures were all intact, undamaged and firmly held in place. The shear ply to case and shear ply to aluminum floor plate bondlines were visually inspected and probed with a missile tool every 2 to 6 inches on both sides of the systems tunnel on the right-hand motor. The shear ply to case and shear ply to aluminum floor plate bondlines were visually inspected on both sides of the left-hand motor. No unbonds or bondline voids were detected.

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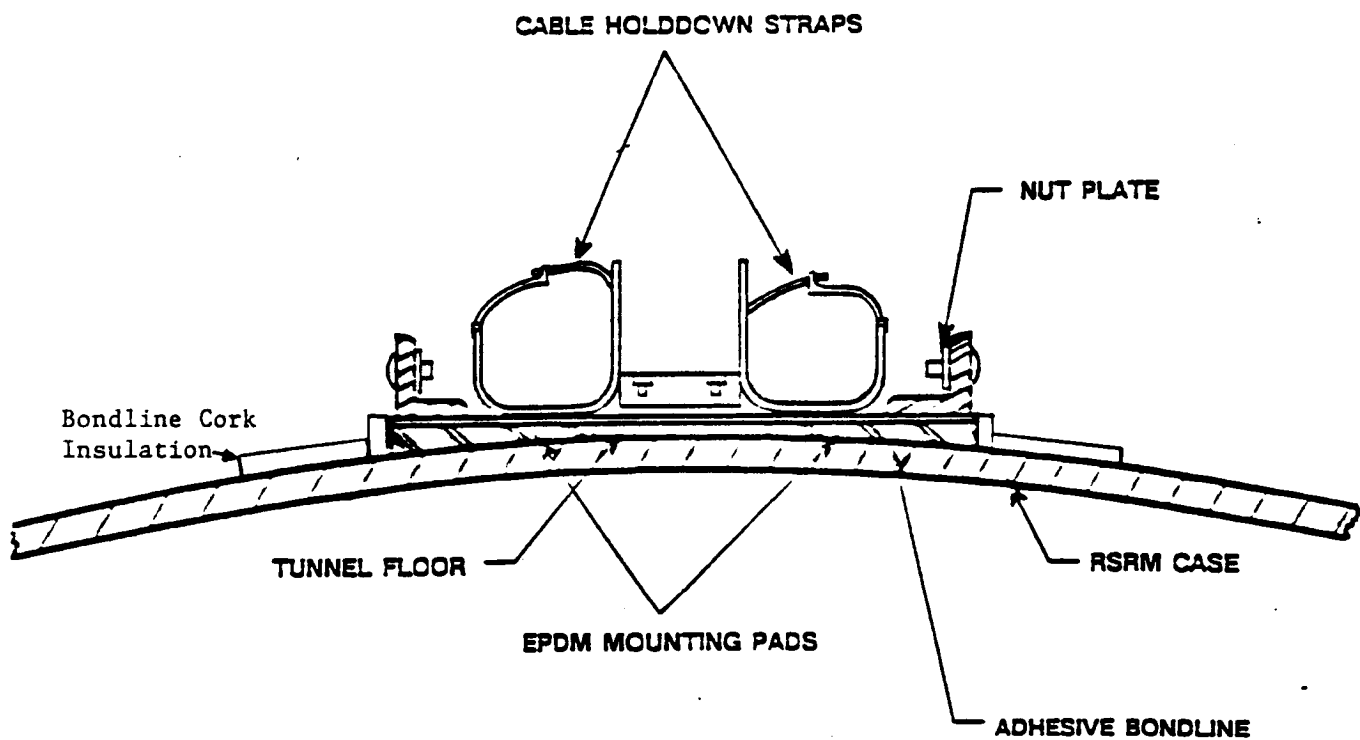
REFERENCE

- 1.. TWR-16475 Vol. VIII Book 1 Revision A, 'KSC Postflight Engineering Evaluation Plan (Systems Tunnel Component)', S. Olsen, 23 November 1988.

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Systems Tunnel Cross Section
Figure 1

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